

No. 4. — *A Third Supplement to the Fifth Volume of the Terrestrial Air-Breathing Mollusks of the United States and adjacent Territories.* By W. G. BINNEY.<sup>1</sup>

As promised in the Second Supplement, the Eastern Province Species are here given, with addenda to those of the other Provinces. My purpose is to bring the subject down to this date. The "Manual of American Land Shells," published subsequently to Vol. V., must also be used in connection with the present paper. I have added figures of many species to replace those of Volume V.

BURLINGTON, NEW JERSEY, January 1, 1890.

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SPECIES OF THE NORTHERN REGION.

It must be borne in mind that the Universally Distributed Species are also found here. They are:—

**Patula striatella**, ANTHONY.

**Microphysa pygmæa**, DRAP.

Placed in this genus on account of the similarity of its jaw and lingual dentition to those of other species of *Microphysa*. See 2d Suppl., p. 35.

**Helicodiscus lineatus**, SAY.

**Vallonia pulchella**, MÜLL.

**Pupa muscorum**, LINN.

See below, p. 186, for vars. *bigranata* and *Lundstromi*.

It may readily be doubted whether this species is not rather confined to the Northern Region.

<sup>1</sup> The Terrestrial Air-Breathing Mollusks of the United States and the adjacent Territories of North America, described and illustrated by Amos Binney. Edited by A. A. Gould. Boston, Little and Brown, Vols. I, II, 1851; III., 1857. Vol. IV., by W. G. Binney, New York, B. Westermann, 1859 (from Boston Journ. Nat. Hist.). Vol. V., forming Bull. Mus. Comp. Zoöl., Vol. IV., 1878. Supplement to same, in same, Vol. IX. No. 8, 1883. Second Supplement, in same, Vol. XIII. No. 2, 1886.

*Zonites nitidus*, MÜLL.  
*arboreus*, SAY.  
*indentatus*, SAY.

See Suppl., p. 139.

*Zonites minusculus*, BINN.

Dall thus describes a var. *Alachuana* (Pr. U. S. Nat. Mus., 1855, 270): —

A form of it which, at first sight, looks different from *minuscula* is rather larger than usual, and above shows no differences. On the base in the type the junction of the inner lip with the body whorl takes place, following the course of the whorl, inward from the middle line of the base of the whorl and generally about the inner third. This gives a peculiarly thimble-shaped umbilicus. In the variety under consideration, the above mentioned junction takes place outside of the middle line, or even at the outer third, while the aperture is a little dilated. The result of this is to show a much larger portion of the base of the penultimate whorl, and to alter the facies of the umbilicus. For this form, found in Alachua County, Florida, I would suggest the varietal name *Alachuana*.

*Zonites viridulus*, MKE.  
*milium*, MORSE.  
*fulvus*, DRAP.

These will not be repeated in the lists of the various Regions into which the Province may be divided. (See Vol. V., p. 17.)

The following are Northern Region Species: —

*Vitrina limpida*, GLD.  
*Angelicæ*, BECK.

*Vitrina exilis*, MORELET.

The distinction between the Eastern, Central, and Pacific Provinces not being marked in these high latitudes, this species is given here. It might, perhaps, with *Patula pauper* and *Pupa borcalis*, rather be considered a species of the Pacific Province.

*Zonites Fabricii*, BECK.  
*Binneyanus*, MORSE.  
*ferreus*, MORSE.

*Zonites exiguus*, STIMPSON.

Plate III. Fig. 4.

The figures are copies of original drawings of Dr. Stimpson.

*Zonites multidentatus*, BINNEY.

See Suppl., p. 144.

*Acanthinula harpa*, SAY.  
*Patula asteriscus*, MORSE.

**Patula pauper**, GOULD.

See remarks under *Vitrina exilis*, above.

**Pupa Blandi**, MORSE.

**borealis**, MORELET.

See remark under *Vitrina exilis*.

The figure was drawn by me from a specimen collected at the original locality.



Pupa borealis,  
enlarged.

**Pupa decora**, GOULD.

**Höppii**, MÖLLER.

**Vertigo Gouldi**, BINNEY.

**Bollesiana**, MORSE.

A variety *Arthuri*, from Dakota, is mentioned by Von Martens, Gesell. Nat. Freunde zu Berlin, 21 Nov., 1882, p. 140.

Very near, if not identical with, *V. milium*.

**Vertigo simplex**, GOULD.

**ventricosa**, MORSE.

Very near, if not identical with, *V. Gouldi*.

**Ferussacia subcylindrica**, LINN.

In the mountains of McDonnell Co., North Carolina, a colony of this species was found by Mr. Hemphill. He found no colony of *Vitrina*, which might be expected to exist at those high elevations.

**Succinea Haydeni**, W. G. B

**Verrilli**, BLAND.

**Grönlandica**, BECK.

**Higginsi**, BLAND.

**Totteniana**, LEA.

Dr. Westerlund, in the "Land- och Söttvatten-Mollusker" of the Vega Expedition, quoted in the Manual of American Land Shells, pp. 473, 474, also catalogues from Arctic America the following species:—

**Limax hyperboreus**, WESTERLUND. (See below, p. 205.)

**Pupa arctica**, WALL.

**columella**, BENZ.

**Succinea chrysis**, WESTERLUND. (See p. 186.)

**turgida**, WESTERLUND.

**annexa**, WESTERLUND. (See p. 186.)

**Vallonia Asiatica**, NEVIN.

**Pupa edentula**, DRAP. ?

**signata**, MS.

**Vertigo Bollesiana**, var. *Arthuri*.

**Pupa muscorum, var. bigranata, ROSS.**  
**muscorum, var. Lundstromi, WESTERLUND.**  
**columella, BENZ., var. Gredleri, CLESSIN.**  
**Krausseana, REINH.**

Of the above, descriptions and figures are given of two only, *Succinea chrysis* and *S. annexa*, which are copied here.

**Succinea chrysis, WESTERLUND.**

(Figures copied on my Plate I. Fig. 14.)

Testa oblongo-ovata, solida, irregulariter transversim striata vel sæpe costulato-plicata, colore varia, sæpissime spira pallidiore, apice rubro, anfractu ultimo antice rotuntiore, subviolaceo-rufescente, postice pallidiore, ubique strigis transversis numerosis albidis; spira elevata, acuta, anfr.  $3\frac{1}{2}$ , convexi, ultimus deorsum lente attenuatus, penultimus subtus tumidulus, antepenultimus transversalis, extus depressus, sutura forte excisa, anfr. ultimo minutissimo; sutura perimpressa, apertura ovata, intus aureo-micans, pariete arcuatula, obliqua; peristoma obscure marginatum, marginibus æqualiter arcuatis (exteriore superne ad insertionem forte curvato), in pariete callo tenuissimo albido conjunctis.



*Succinea  
chrysis.*

Long.  $11\frac{1}{2}$ , diam.  $7\frac{1}{2}$ , ap.  $7\frac{1}{2}$  mm. l., 5 mm. d.; long. 13, diam.  $7\frac{1}{2}$ , ap. long. 9, diam.  $7\frac{1}{2}$  mm.; long. 10, diam. 6, ap. long.  $6\frac{1}{2}$ , diam. 5 mm.

Asia: America, Port Clarence, Alaska.

I figure also a specimen from St. Michael's, Alaska (Dall), which has usually been referred to a form of *S. lineata*.

**Succinea annexa.**

(Figures copied on my Plate I. Fig. 15.)

Testa elongato-ovata, fragilis, intus rugas incrementales fuscas (in spec. max.) validas et extus abruptas dense striata, anfr. penultimo dense distincte spiralliter lineata, anfr. ultimo transversim irregulariter alternatim rufo- et albido-strigata; sutura impressa; spira exserta, apice mamillata; afr. 4, ultimus convexus, penultimus tumidus, antepenultimus altus, exitus convexus, sutura tenui a præcedente sejunctus, summus (subtus visus) globosus; apertura ovata, pariete obliqua, columella arcuata, marginibus linea tenui alba junctis. Long. 11, diam. 8, apert. long. 8, diam. 6 mm.; long. 10, diam.  $6\frac{1}{2}$ , apert. long. 6, diam.  $4\frac{1}{2}$  mm.

Fort Clarence, Alaska.

INTERIOR REGION SPECIES.

**Macrocyllis concava, SAY.**

**Zonites capnodes, W. G. B.**

**fuliginosus, GRIFFITH.**

**friabilis, W. G. B.**

**Zonites lævigatus**, PFEIFFER.

Rugeli, W. G. B.

See Suppl., p. 138.

**Zonites demissus**, BINNEY.

The variety *acerrus* has been found near Fort Gibson, Indian Territory, by Mr. Simpson.

**Zonites ligerus**, SAY.

A variety *Stonei* is thus described by Mr. Pilsbry: "From Mr. Witmer Stone I have received a form of *Z. ligerus* differing from the type in having a concave, broadly excavated base, with comparatively wide umbilicus, collected by him in New Castle Co., Del. The axis in the type is barely perforated; but in this form it is a millimeter or more wide, and the base around it broadly concave." (*Nautilus*, III. 4, p. 46, Aug., 1889.)

**Zonites intertextus**, BINNEY.

subplanus, BINNEY.

See Suppl., p. 139.

**Zonites inornatus**, SAY.

sculptilis, BLAND.

Elliotti, REDFIELD.

limatulus, WARD.

capsella, GOULD.

Lawæ, W. G. B.

See Suppl., p. 142, Plate II., Fig. E. The name is suggested for the shell figured by me in Vol. V. (Fig. 44) as *Z. placentula*.

**Zonites placentula**, SHUTTLEWORTH.

See Suppl., p. 142.

**Zonites Wheatleyi**, BLAND.

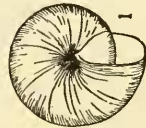
See Suppl., p. 141. Clingham's Peak, N. C. (Hemphill).

**Zonites petrophilus**, BLAND.

Habersham Co., Ga.; Clarkesville, N. C. (Hemphill). See Suppl., p. 140.

**Zonites Sterkii**, DALL.

Shell minute, thin, yellowish translucent, brilliant, lines of growth hardly noticeable, spire depressed, four-whorled; whorls rounded, base flattened, somewhat excavated about the centre, which is imperforate; aperture wide, hardly oblique, not very high, semilunate, sharp-edged, the upper part of the columella slightly reflected; upper surface of the whorls roundish, though the spire as a whole is depressed. Greater diam. 1.1, height 0.52 mm.



*Zonites Sterkii*,  
enlarged.

New Philadelphia, Ohio. Collected on a grassy slope, inclining to the northward, and covered with grass, moss, and small bushes, and so far has not been found elsewhere. Clearly not young of a *Pupilla* or *Zonites*. It is probably one of the smallest species known, and remarkable for its imperforate umbilicus.

The above forms a portion of the description by Dall of *Hyalina Sterkii*, from Proc. U. S. Nat. Mus., XI., p. 214, Figs. 1, 2, 3, 1888. The figure given by me is drawn from an authentic specimen.

*Zonites gularis*, SAY.  
*suppressus*, SAY.  
*cuspidatus*, LEWIS.

See Suppl., p. 143.

Miss Law thus wrote from Philadelphia, Tenn., of this species: "Unlike *gularis* it seems to be a rare shell, and I find it only by scraping off the surface of the ground in the vicinity of damp mossy rocks. Its habits are more like *placentula* than *gularis*. Neither Miss Clara Bacome nor I ever mistake one for a *gularis*, even before picking it up; the thickened yellow splotch near the lip, and the thinner spot behind, showing the dark animal through it, as well as its more globular form, particularly on the base, make it look very different when alive."

*Zonites lasmodon*, PHILLIPS.

Plate III. Fig. 5.

Enlarged drawings by Miss Lawson are given of this species.

*Zonites macilentus*, SHUTTL.

See Suppl., p. 143.

*Zonites significans*, BLAND.

See Suppl., p. 144.

*Zonites Andrewsii*, W. G. B.

See Suppl., p. 144.

*Zonites internus*, SAY.

*Vitrinizonites latissimus*, LEWIS.

See Suppl., p. 145; for other localities, see Man. of Am. Land Sh., p. 231, Also in Washington Co., N. C., and in Watauga Co. at Banner's Elk (Hemphill).

*Limax campestris*, BINNEY.

*Limax montanus*, *castaneus*, *occidentalis*, *hyperboreus*, and *Hemphilli* are probably identical with this.

*Tebennophorus Caroliniensis*, Bosc.

*Tebennophorus dorsalis*, BINNEY.

*Tebennophorus Wetherbyi*, W. G. B.

See Plate VI. Fig. F.

**Tebannophorus Hemphilli, W. G. B.**

Plate VI. Fig. H.

See Man. of Amer. Land Sh., p. 247.

The animal is long, narrow, cylindrical, with pointed tail. Its color is black. The jaw is strongly arched, with median projection, and four or five ribs converging to the centre, all crowded on the middle third, the outer thirds being ribless. The lingual membrane has 24-14-1-14-24 teeth, all of same types as figured by Morse for that of *T. dorsalis*. Length of largest individual contracted in spirit 25 mm.

The penis sac is long, cylindrical, receiving retractor muscle and vas deferens at its summit.

**Patula solitaria, SAY.****alternata, SAY.****Cumberlandiana, LEA.****perspectiva, SAY.****Bryanti, HARPER.**

See Suppl., p. 147.

**Helicodiscus fimbriatus, WETTERBY.**

See Suppl., p. 148.

A curious form, wanting the epidermal fringe and most of the revolving ridges, was found in great numbers near Fort Gibson, Indian Territory, by Mr. C. T. Simpson. The same form has been found by Mr. Hemphill on Salmon River, Idaho. He proposes for it the name *Salmonucea*.

**Strobila labyrinthica, SAY.**

A form from Venezuela, without the costæ, is noticed by Dall as var. *Morsei* (U. S. Nat. Mus. Proc., 1855, p. 263).

**Polygyra leporina, GOULD.****Hazardi, BLAND.****Troostiana, LEA.****fastigans, SAY.****Stenotrema spinosum, LEA.****labiosum, GOULD.****Edgarianum, LEA.****Edwardsi, BLAND.****barbigerum, REDFIELD.****stenotremum, FERUSSAC.****hirsutum, SAY.**

A widely separated locality is the bank of the Yaqui River, near Guaymas (Palmer).

**Stenotrema maxillatum, GOULD.****monodon, RACKETT.****Triodopsis palliata, SAY.**

**Triodopsis obstricta**, SAY.  
**appressa**, SAY.

It is quoted by Von Martens from the banks of the Columbia River, but from drawings and description of the single specimen found by Kraus, kindly sent me by Dr. Von Martens, it appears that the species was confounded with flattened forms of *Mullani* or *devius*.

**Triodopsis inflecta**, SAY.

A depauperated form of this species is about being described and figured as *T. edentula* by Mr. F. A. Sampson.

**Triodopsis Rugeli**, SHUTTLEWORTH.  
**tridentata**, SAY.

The deformed specimen figured is one of *appressa*, not of this species.

**Triodopsis fallax**, SAY.  
**introferens**, BLAND.  
**Van Nostrandii**, BLAND.

Also, Jacksonville, Florida.

**Mesodon major**, BINNEY.

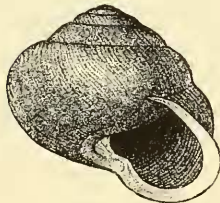
On Plate I. Fig. 2, I have figured the dentition of an individual of this species differing from that figured in Vol. V. Plate VIII. Fig. G, by wanting the side cusps and cutting points of the central and first lateral teeth. The individual from which the lingual was extracted is labelled B in the collection given by me to the United States National Museum. Fig. 3 gives an outer lateral of the same membraue, on which the side cusp and cutting point are present. Fig. 1 gives a central tooth with side cusps and cutting points from the membraue of the specimen labelled A.

The figures show a larger range of variation in the dentition of individuals of the same species than would have been anticipated. (See also *M. Andrewsii*.)

**Mesodon albolabris**, SAY.  
**Andrewsi**, W. G. B.

In the Mannual of American Land Shells, p. 302, I have described and figured specimens of a larger form of this species, which would be called *major* by most collectors, but which has the genitalia and lingual dentition of *Andrewsi*. (See figure above.)

The penis sac of *Andrewsi* was described by me as constricted in the middle. Further study has convinced me that it is rather twisted than constricted. On Plate I. Fig. 4, I give a figure of the genitalia to show this; and in Fig. 5, the penis sac of still another individual



Mesodon major.



In studying the lingual membrane of many individuals of *M. Andrewsii*, I have found some variation. I give here notes on membranes of specimens labelled as specified in the Binney collection in the United States National Museum.

AA. 60-1-60 teeth, with about 14 laterals on each side.

N. 51-1-51 teeth, with 11 laterals; some extreme marginals have decidedly multifid cusps.

Q, from Hayesville, N. C., has also about 11 laterals.

V has 9 laterals, 60-1-60 teeth.

M. 60-1-60 teeth, with about 14 laterals. Some outer laterals have side cusps: one is figured on Plate I. Fig. 12.

G has same count as M; no side cusps to outer laterals.

N has 64-1-64 teeth, with 14 laterals. The extreme laterals have side cusps.

L has 61-1-61 teeth, with 11 laterals; no side cusps on outer laterals.

J same. 64-1-64 teeth, with 14 laterals.

B. 60-1-60 teeth, with 16 laterals, none with side cusps.

F. All laterals, even first, have decided side cusps (see Plate I. Fig. 10) and cutting points: and marginals also (Fig. 11). 50-1-50 teeth, with 15 laterals.

K. 53-1-53 teeth, with 14 laterals.

I. 50-1-50 teeth, outer laterals with side cusps.

O. 68-1-68 teeth, with 14 laterals.

As remarked above, most collectors will refer this large form of *Andrewsii* to *major*. It differs from that species as hitherto understood very decidedly in its lingual dentition and genitalia. In its shell, also, the species differs from the generally known *major* in so marked a manner, that from it alone I could say, before examination, what were the characters of the dentition and genitalia of every specimen collected by Mr. Hemphill in the mountains of North Carolina. One of the puzzling questions to be left to future solution is the limitation of *albolabris*, *major*, and *Andrewsii*. It must be studied from the lingual dentition and genitalia, as well as from the shell. The student must also consider whether the *Helix major* of the Boston Journal and of the Terrestrial Mollusks are the same species.

Practically, the simplest way of treating specimens in collections is to refer to a variety of *albolabris* all forms more resembling that species than they do the *major* of the Terrestrial Mollusks, and to call *major* all specimens most nearly conforming to the figure and description of that species in Terrestrial Mollusks of U. S., Vols. II. and III. In the former category would be placed the *major* of the Boston Journal; in the latter, the large forms I have referred to *Andrewsii* in Manual of American Land Shells, such, for instance, as are figured in Fig. 322½, repeated here, *ante*, page 190. This variety of *albolabris* and this *major*, as above identified, would be found to differ widely in dentition and genitalia, the former in these respects resembling *albolabris*, the

latter *Andrewsi*. The latter species must also be recognized as subject to variation, rendering it in some cases difficult to separate from *major*,—never from the large variety of *albolabris*.

The original specimen of *major* of the Terrestrial Mollusks was included in the collection given by Mr. J. S. Phillips to the Philadelphia Academy of Sciences. The points in which it differs from the large form of *albolabris* are pointed out in Terrestrial Mollusks, Vol. II. p. 98.

**Mesodon multilineatus, SAY.**

**Pennsylvanicus, GREEN.**

**Mitchellianus, LEA.**

**elevatus, SAY.**

**Clarki, LEA.**

**Christyi, BLAND.**

**exoletus, BINNEY**

**Wheatleyi, BLAND.**

**dentiferus, BINNEY.**

In a specimen collected by Mr. Hemphill, at Banner's Elk, N. C., I found the tractor muscle of the penis sac near its junction with the vas deferens, not at half the length of the latter. There was no constriction to the penis sac.

**Mesodon Wetherbyi, BLAND.**

**thyroides, SAY.**

**clausus, SAY.**

**Downieanus, BLAND.**

**Lawæ, LEWIS.**

**profundus, SAY.**

**Sayi, BINNEY.**

**Pupa pentodon, SAY.**

The enlarged view of the aperture gives on the left *P. Tappaniana*, on the right *P. curvidens*.

Under the name of *Pupilla Floridana*, Mr. Dall has described what I consider as a form of this species in Proc. U. S. Nat. Mus., 1885, p. 251, Plate XVII. Fig. 11.

Shell greenish spermaceti-white; when living, the tissues of the animal show with pale salmon-color through the shell in the apical whorls; surface smooth or lightly striated, with a tendency to retain dirt upon itself; form subcylindrical, with a rather obtuse apex, the last whorl forming nearly half the shell; suture evident; whorls five, neatly rounded; aperture longer than wide; lip white, thin, reflected; teeth about nine, of which there are generally three larger than the rest, their tips nearly meeting, and their bases mutually nearly equidistant; one is on the pillar, one on the body whorl, and one on the anterior margin; on either side of the latter are two generally subequal much smaller denticles. Lon. 1.60, lat. 0.75 mm.

*Habitat.* — Under loose oak bark, oak hamak, Archer, Alachua County, Florida, April, 1885, W. H. Dall, sixteen specimens.

This is one of our smallest species, and is related to *P. pentodon* and *P. pellucida*. It is about half the size of the former and much more slender. Its teeth recall those of *P. curvidens*, Gould, in their arrangement, but the shell is more cylindrical and smaller than it is in *P. pellucida (servilis)* as figured by Gould. The teeth are more numerous than in the latter shell, and set, as in *P. pentodon*, in one series; not, as in *pellucida*, partly deeper in the throat.

I describe this with some hesitation, for the condition in which the Pupidæ and Vertigos of North America are is most unsatisfactory, and offers an excellent field to some careful student who shall be able to examine and figure large series of authentic specimens. Still, as there is absolutely no other form with which I feel able to unite this one, it is better to give it a name than to leave it erroneously with some other species.

The above description is copied from that of Dall, while the figure, Plate XVII. Fig. 11, is copied in my Plate III. Fig. 2. I have seen no specimen of it.

**Pupa fallax, SAY.**

**armifera, SAY.**

**contracta, SAY.**

**Pupa Holzingeri, STERKI.**

Shell narrowly perforated, turritid-cylindrical, vitreous (or whitish), very minutely striate, shining; apex rather pointed; whorls 5, regularly increasing, well rounded, especially the upper ones, the last somewhat narrowed and a little ascending towards the aperture, compressed at the base but not carinated, at some distance from the outer margin provided with an oblique, rather prominent, acute crest corresponding in direction to the lines of growth, extending from the base to the suture, formed by a whitish callosity; behind the crest the whorl is flattened, and corresponding to the lower palatal lamella, impressed; aperture lateral, scarcely oblique, relatively small, inverted subovate, with a slight sinus at the upper part of the outer wall, margins approximated; peristome moderately reflected; lamellæ 6; one parietal, rather long, very high, in its middle part curved outward, towards the aperture bifurcated, the outer branch reaching the parietal wall; one columellar, longitudinal, rather high, its upper end turning in nearly a right angle towards the aperture, but not reaching the margin; basal exactly at the base, short, high, dentiform; 3 in the outer wall, viz.: the lower palatal long, ending in the callus, highest at about its middle; the upper short, rather high on the callus; above the upper, one supra-palatal, quite small, dentiform, nearer the margin.

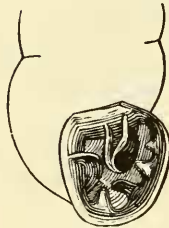
Length 1.7 mm., diam. 0.8 mm. = .068 × .032 inch.

As already stated, our species ranges beside *P. armifera* and *P. contracta*, Say, standing nearer the latter. Yet it is different from this species by the shape of the aperture, the wanting callus<sup>1</sup> connecting the margins on the

<sup>1</sup> In many specimens of *P. contracta* so strongly developed that the peristome is rendered continuous.

body whorl, by the longer crest behind the aperture, which in *contracta* disappears in about the middle of the (height of the) whorl, and by the wanting constriction, especially in the columellar wall, not to speak of the size and shape of the whole shell. The lamellæ also show some marked differences, such as the presence of a high basal, the shorter columella not reaching the base, but with relatively larger horizontal part, the bifurcation of the parietal and the presence of a supra-palatal, the last just as it is in *P. armifera*.

It must be added here that the specimen first obtained from Minnesota in several respects differs from those found in Illinois and Iowa, which I consider as typical; by its size which is one third smaller, by the basal lamella developed in a peculiar way, being rather longer at the truncated top than at its foot, and by the stronger, thicker palatal lamellæ. Yet, as there was only one specimen, it was liable to be an individual peculiarity, — even then of interest. Should, however, more specimens be found with the same configuration, they would represent a distinct and well characterized variety; possibly it is a peculiar northern form.



Pupa Holzingeri,  
enlarged

New Philadelphia, Ohio, June, 1889.

The above is a description by Dr. V. Sterki<sup>1</sup> of a Pupa received by him from Winona, Minn., and Northern Illinois. He kindly furnished me the above figure.

*Pupa rupicola*, SAY.

*corticaria*, SAY.

*Vertigo milium*, GOULD.

*ovata*, SAY.

*Succinea retusa*, LEA.

*ovalis*, SAY.

*avara*, SAY.

*aurea*, LEA.

*obliqua*, SAY.

#### SOUTHERN REGION SPECIES.

*Glandina Vanuxemensis*, LEA.

*truncata*, SAY.

*bullata*, GOULD.

*decussata*, PFEIFFER.

*Texasiana*, PFEIFFER.

Lingual membrane as usual in the genus. Teeth 35-1-35. Central small, narrow, with a single blunt rounded cutting point. See Plate IX. Fig. G.

<sup>1</sup> The Nautilus, Vol. III, No. 4, p. 37, August, 1889.

**Zonites caducus**, PFEIFFER.  
*cerinoideus*, ANTHONY.  
**Gundlachi**, PFEIFFER.

Found also in Texas, at Hidalgo, by Dr. Singley.

**Zonites Singleyanus**, PILSBRY.

Shell minute, broadly umbilicate, planorboid, the spire scarcely perceptibly exerted; subtranslucent, waxen white, shining, smooth, under a strong lens seen to be slightly wrinkled by growth-lines; whorls three, rather rapidly increasing, separated by well impressed sutures, convex, the apex rather large; body whorl depressed, slightly descending, indented below around the umbilicus; aperture small, semilunar, oblique; peristome simple, acute. Umbilicus nearly one third the diameter of the shell, wide, showing all the whorls.

Alt. 1, diam. 2 mm.

New Braunfels, Comal Co., Texas.

Allied to *Z. minusculus*, but much more depressed, more shining, smoother, smaller, with broader umbilicus and a complete whorl less than *minusculus*.

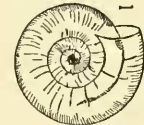
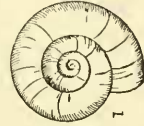
This species, one of the most distinct of the smaller forms of *Hyalina*, was communicated to me by Mr. J. A. Singley, in whose honor it is named. I have also found a few specimens among the shells collected by myself in Central Texas, during the winter of 1885-86. With *Z. Singleyanus* at New Braunfels are found quantities of *Z. minusculus*. The latter species exhibits some variation, being often more depressed than more northern specimens. This depressed form has been noticed in Mexico by Strebel, who proposes for *Z. minusculus* the new generic title of *Chanomphalus*, which is, of course, completely synonymous with *Pseudohyalina*, Morse, 1864, and this, again, is not different enough from *Hyalina* to warrant the erection of a new genus or subgenus. There is some variation in the width of the umbilicus in Texan specimens of *Z. minusculus*, but I have not seen specimens with it so wide as Dr. Dall indicates for his var. *Alachuana* from Florida. *H. elegantulus*, Pfr., is about the size and form of my *Zonites Singleyanus*, but it is a strongly sculptured species.

The above description was published by Pilsbry, Proc. Phil. Acad., N. S., 1889, p. 84, Plate XVII. Figs. 6, 7, 8. A specimen kindly furnished me by Dr. Singley for the purpose is drawn in my figure.

**Zonites Dallianus**, SIMPSON.

Shell minute, depressed, narrowly umbilicated, fragile, pale straw-colored, somewhat shining; under a lens seen to be marked with delicate growth-lines above, smoother beneath. Spire a little convex; apex subacute; sutures scarcely impressed. Whorls three and one half, scarcely convex, the last wide. Aperture oblong-lunate, oblique, upper and lower margins sub-parallel, slightly converging; peristome acute. Alt.  $1\frac{1}{2}$ , diam. maj. 3, min.  $2\frac{1}{2}$  mm.

West Florida, at Shaw's Point, Manatee Co., and Little Sarasota Bay.



*Zonites Singleyanus*, enlarged.



*Zonites Dallianus*, enlarged.

Differs from *Z. arboreus*, Say, in the smaller spire and wider last whorl; fewer whorls; differently shaped aperture. It is about half the size of *Z. arboreus*, and the sculpture is the same as in that species. The *Helix Ottonis* of Pfeiffer, of which specimens from Cuba and Hayti are before me, has no special relationship to this species, but is undoubtedly a synonym of *Z. arboreus*, as Pfeiffer himself concluded. *H. Ottonis* differs from *arboreus* in nothing but the lighter color; the form and dimensions are precisely as in *arboreus*. (See Pfr. in Wiegmann Archiv für Naturgeschichte, 1840, p. 251; the species was never described in the Monographia Heliceorum.)

The aperture in *Z. Dallianus* is less lunate than in *Z. arboreus*, embracing less of the penultimate whorl; seen from beneath, the greater portion of the aperture lies outside of the periphery of the penultimate whorl; whilst in *Z. arboreus* the reverse is the case. The much smaller size of *Dallianus* also separates it from *Z. arboreus*.

This species was sent me under the above name by Mr. Charles T. Simpson, the well known student of Floridian shells. The same form I find in the museum of the Academy, collected by Mr. Henry Hemphill.

The above description was published by Mr. Pilsbry in Proc. Phil. Acad., N. S., 1889, p. 83, Plate III. Figs. 9, 10, 11. A specimen kindly furnished me for the purpose by Mr. Pilsbry is also figured above.

### *Microphysa incrustata*, POEY.

vortex, PFEIFFER.

All the specimens received from West Florida collected by Mr. Hemphill, and from East Florida by Mr. G. W. Webster, are heavily incrustated with dirt.

### *Microphysa* (?) *dioscoricola*, C. B. ADAMS.

Shell minute, subperforate, conic globose, thin, very delicately striate, horn-colored; spire elevated, obtuse; whorls 3-3½, convex, the last medially subimpressed; aperture lunately rounded; peristome simple, acute, the columellar margin subvertically descending, very slightly reflected, diam. greater 1¼, lesser 1⅔, height 1½ mm. (Pfr.).



*Microphysa dioscoricola*, enlarged.

This species is placed by Von Martens (Die Heliceen, p. 73) in *Conulus*, a subgenus of *Hyalina*, with *fulvus*, *Gundlachi*, and others. Mr. Dall tells us (Nautilus, III. 25) that it belongs to *Microconus*. This last is synonymous with *Microphysa*, a subgenus of *Zonites*, according to Tryon, Syst. Conch., III. 24.

Mr. Dall says also that the species was originally described from Jamaica by Adams, and subsequently from Trinidad by Guppy as *cæca*. In its jaw and lingual dentition it seems to agree with most of the other species of *Microphysa* which I have examined. I retain it, therefore, in that genus.

The species seems widely distributed in Florida. St. Augustine; Blue Spring, St. John's River; Lake Worth to Hawk's Park along the east coast; Hilo River, emptying into Mosquito Inlet, east coast, not Hillsborough River, emptying into Tampa Bay, as stated by Dall. The specimens examined by me

were collected by G. W. Webster at Hawk's Park, "widely distributed in dry places, where other species are not found." Also at Hidalgo, Texas (Singley).

The shell is figured on preceding page.

The jaw (Plate III. Fig. 6) is high, strongly arched, with acuminated ends; it is very thin, membranous, light horn-colored and transparent; there are numerous — some fifteen on each side the median line — narrow, delicate ribs, running obliquely to this line, denticulating either margin; on the upper median portion the ribs meet before reaching the lower margin, leaving upper, median, triangular plates as in *Orthalicus*. The jaw is quite such as I have described and figured for *Macroceramus* in Terr. Moll., V. 384. It also resembles that of *Microphysa turbiniformis* (Ann. N. Y. Acad. Sci., III., Plate XV. Fig. C), excepting that the latter wants the upper median triangular plates. A greatly magnified view of the central portion of the jaw is given.

The lingual membrane is long and narrow. Owing to its small size, it was very difficult to determine the shape of any but the lateral teeth. Three of these last are figured on Plate II., Fig. 5, drawn by camera lucida. They have wide, square bases of attachment, bearing, as usual, two cusps, both stout and blunt, and bearing short, stout cutting points; the centrals appear of the same shape and tricuspid, but I failed to distinguish them clearly enough to draw by camera; the laterals are separated, low, wide, quadrate, with long irregularly serrated cusp. I failed also to distinguish these clearly enough to draw by camera. I have represented them in the figure as they appeared to me. The laterals seem like the teeth of *Pupa*, the marginals much like those of *Cionella subcylindrica*. The dentition is somewhat similar to what I have figured of *vortex* on page 356 of the Manual of American Land Shells. There are about 15–15 teeth, with six perfect laterals on each side the median line.

Mr. Dall says of this species that the shell is much smaller than that of *granum*, olive-greenish, with a silky lustre and few inflated whorls, the first of which is usually finely punctate. The suture is very deep, and the umbilicus is proportionally larger than in *granum*.

The figure of the dentition of an undetermined species found by Dr. W. M. Gabb, in Costa Rica, published by me in the Annals of the New York Academy of Science, Vol. III. p. 261, Plate XI. Fig. G, is said by Mr. Pilsbry to represent that of this species, — he having identified the shell from which the lingual was extracted to be *H. cava*, Guppy.

**Hemitrochus varians, MENKE.**

**Strobila Hubbardi, BROWN.**

**Polygyra auriculata, SAY.**

Dall (U. S. Nat. Mus. Proc., 1855, p. 263) thus characterizes a variety *microforis* :—

This form is quite well marked, and when fully adult shows as a rule little variation from the form figured by the Binneys, and generally regarded as typical. A quite uniformly characterized variety was found, however, by me at Johnson's

Sink, Alachua County, Florida, where it was abundant. Some twenty specimens were picked up in a few moments during a hurried visit made with other ends in view, and a quart could easily have been gathered in half an hour. This form is distinguished by its generally smaller size (max. diam. 12.0, min. diam. 10.0, alt. 6.0 mm.) as compared with the type (15.0, 12.0, and 7.9 mm.), and by being more closely rolled, thus having not only an actually smaller umbilicus, but one in which one third less of the preceding whorl is visible. The specimens were uniform in this, and in all other respects were like the typical *auriculata*.

**Polygyra uvulifera**, SHUTTLEWORTH.

**auriformis**, BLAND.

**Postelliana**, BLAND.

**espiloca**, BLAND.

**avara**, SAY.

**ventrosula**, PFEIFFER.

**Hindsi**, PFEIFFER.

**Texasiana**, MORICAND.

**triodontoides**, BLAND.

**Mooreana**, W. G. B.

**hippocrepis**, PFEIFFER.

Through the kindness of Mr. Singerly, I have the opportunity of examining the jaw and lingual membrane.

Jaw long, low, ends blunt; anterior surface with over 14 ribs denticulating either margin.

Lingual membrane long and narrow (Plate III. Fig. 8, *a*, *b*). Centrals tricuspid, laterals bicuspid, marginals low, wide, irregularly denticulate. Teeth 30-1-30, the ninth lateral having its inner cutting point bifid.

**Polygyra Jacksoni**, BLAND.

A form was found abundantly near Fort Gibson, Indian Territory, by Mr. C. T. Simpson, who thus describes it in Proc. U. S. Nat. Mus., 1888, p. 449.

Instead of the bicrural tooth on the body whorl, at the aperture there is a heavy elevated deltoid callus, which is joined to the upper and lower margins of the peristome, and which occupies about the same area as the tooth in the type. The number of whorls is 5; greater diam. 7, lesser 6, height 3 mm. In examining several hundred specimens, I have found none which approach the type, and I would therefore propose for it the varietal name of *deltodea*.

**Polygyra oppilata**, MORICAND.

**Dorfeuilleana**, LEA.

**Ariadnæ**, PFEIFFER.

**septemvolva**, SAY.

**cereolus**, MUELFELDT.

**Carpenteriana**, BLAND.



**Polygyra Febigeri**, BLAND.  
*pustula*, FÉRUSAC.  
*pustuloides*, BLAND.

**Triodopsis Hopetonensis**, SHUTTLEWORTH.  
*Levettei*, BLAND.

See 2d Suppl. This species may perhaps be considered one of the Central Province. A variety, however, approaches very nearly the Indian Territory shell lately described as *Mesodon Kiowaensis*. This variety is toothless. It is smooth, like *Levettei*, and has six whorls.

**Triodopsis vultuosa**, GOULD.  
*Copei*, WETHERBY.

See 2d Suppl. To the synonymy add *Triodopsis Cragini*, Call, Bull. Washburne Coll. Library, I., No. 7, p. 202, Fig. 5, Dec., 1888, Topeka, Kansas. I have seen an authentic specimen, given by Mr. Call to the National Museum. It is figured here.

**Mesodon Romeri**, PFEIFFER.  
*divestus*, GOULD.

The typical form has few separated, very stout ribs; a variety from Eufala, Indian Territory, sent me by Mr. C. T. Simpson, has numerous fine ribs and revolving microscopic lines. One individual is 24 mm. in greater diameter.

**Mesodon jejunus**, SAY.

See Manual of American Land Shells, p. 390.

**Mesodon Kiowaensis**, SIMPSON.

Shell umbilicated, orbicularly depressed, solid, dark brown in color; whorls 5, with rather coarse striæ, and fine revolving impressed lines, which are much more conspicuous on the last whorl. Suture deeply impressed, leaving the whorls well rounded; aperture oblique, somewhat transversely rounded, forming fully three fourths of a circle; peristome thick and solid, whitish or purplish, evenly reflected, with a slight constriction behind it; umbilicus moderate, deep, exhibiting but little more than one of the whorls. Greater diam. 15, lesser 13, height 7 mm.

Kiowa Station, about thirty specimens, mostly dead. Limestone Gap, two dead specimens. Another badly bleached shell was obtained not far from Eufaula (Indian Territory).

Jaw with 9 ribs; teeth with fewer laterals than *Sayii*, and the inner cusp is bifid on the marginals, while in *Sayii* it is entire (Simpson).



*Triodopsis Cragini*, enlarged.



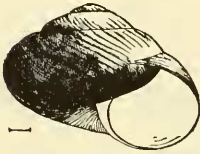
*Mesodon Kiowaensis*.

The foregoing description is copied from the Proceedings of the U. S. National Museum, 1888, p. 449, while the figure is drawn from a specimen kindly furnished by Mr. Simpson.

The shell appears to me to be a toothless form of some *Triodopsis*, rather than a *Mesodon* (see above, under *Triodopsis Levettei*). It also resembles nearly some of the toothless forms of *Triodopsis Mullani*.

***Acanthinula granum*, STREBEL and PFEIFFER.**

Shell small, umbilicated, thin, scarcely shining, light horn-colored, with rib-like striae of growth, crossed obliquely with rib-like folds, in fresh specimens hirsute or with punctate epidermis. Whorls  $4\frac{1}{2}$ , four of them broad, rounded, regularly increasing in size, rapidly in elevation, the last descending, impressed at the umbilicus. Peristome simple, broadly reflected at its columellar margin, partially covering the deep umbilicus, within with whitish, light thickening. Greater diam. 2.8, lesser 2.6, height 2.8 mm.; of aperture, height 1.2, breadth 1 mm. (Strebel and Pfeiffer.)



*Acanthinula granum*,  
enlarged.

*Acanthinula granum*, STREBEL and PFEIFFER, Beitrag zur Kennt. der F. Mex. L. und S. W. Conch., IV., 1880, p. 31, Plate IV. Fig. 13, not Plate IX., as quoted in text.

A Mexican species, found also in Florida; Archer, Alachua Co.; Evans Plantation, Rogers River; Lake Worth (Dall).

Mr. Dall says the shell, when perfect, is nearly the size of *labyrinthica*, very thin, reddish brown, with very deep sutures and a rather deep, small tubular umbilicus. It is covered with beautiful deep oblique epidermal ridges, which are easily lost, and do not agree with the lines of growth.

The figure is drawn from a specimen kindly furnished by G. W. Webster.

***Dorcasia Berlandieriana*, MORICAND.  
*griseola*, PFEIFFER.**

***Bulimulus patriarcha*, W. G. B.  
*alternatus*, SAY.**

I am assured by Dr. Singerly and Mr. Simpson that the form known as *alternatus* does not always have a dark aperture, and the intermingling of the forms leads an observer on the spot to believe *alternatus*, *Schiedeanus*, *Mooreanus*, and *dealbatus* varieties of one and the same species. They were so treated by my father in Vol. II.

***Bulimulus Schiedeanus*, PFEIFFER,  
var. *Mooreanus*, W. G. B.  
*dealbatus*, SAY.**

**Bulimulus serperastrus**, SAY.  
**multilineatus**, SAY.  
**Dormani**, W. G. B.

**Bulimulus Floridanus**, PFEIFFER.

I have already in Terr. Moll., IV., Plate LXXIX. Fig. 3, figured the front view of the typical specimen in Mr. Cumings's collection, drawn by Mr. G. B. Sowerby. The back view is now offered (Plate III. Fig. 7), received from the same source.

A comparison of the front view of Mr. Sowerby's drawing referred to above, with the figure of *Bulimulus Hemphilli* (Plate III. Fig. 9), recently received from Mr. George W. Webster, will lead one to believe the two to be identical. I so suggested in Manual of American Land Shells (p. 408), when treating the variegated shell figured in Fig. 449 of that work, here repeated. There appear to be two varieties of coloring, one corresponding to Pfeiffer's description, and one to Sowerby's figure.

I give the description of *B. Hemphilli* in full, though I believe it to be identical with *Floridanus*.



*Bulimulus  
Floridanus.*

Shell imperforate, very thin, transparent, amber-colored and marked by coarse lines of growth; body whorl with six revolving and slightly interrupted brownish red bands, the lower two being close together and upon the rounded base, spire obtuse, whorls five, slightly convex, the body whorl constituting two thirds of the entire length of the shell. Suture slight, base uniformly and gracefully rounded. Aperture direct and oval, peristome thin. Length, 19 mm.; diameter, 8 mm. Hab. both coasts of South Florida.

Remarks. Mr. Henry Hemphill, of San Diego, Cal., first found a few dead and badly preserved specimens of this shell in 1884, at Marco, west coast of Florida. These Mr. Binney thought identical with *B. Floridanus*, Pf. (See Manual of American Land Shells, 1885.) Numerous specimens collected during the past summer by the author and Mr. G. W. Webster and son, prove beyond a doubt that this is not identical with the shell figured and described on page 407 of Mr. Binney's Manual. The *B. Hemphilli* is more ventricose, not angular at base, imperforate, differs in color, and in fact there is a general difference.

Mr. Berlin H. Wright describes the above species in the West American Scientist, San Diego, April, 1889, p. 8. He found also a variety of uniform light brown or russet color, bandless, which I have figured on Plate III. Fig. 9. This form had a jaw and lingual membrane the same as in *B. Marielinus* and *Dormani*.

**Bulimulus Marielinus**, POEY.  
**Cylindrella Poeyana**, D'ORBIGNY.  
**jejuna**, SAY.

**Macroceramus pontificus, GOULD.**

I give here, for comparison, a figure of the true *M. Kieneri*, from a type in Dr. Pfeiffer's collection, from Honduras.



Macroceramus Kieneri.

Macroceramus Gossei.

**Macroceramus Gossei, PFEIFFER.**

The figure given represents the species.

**Pupa variolosa, GOULD.**

**modica, GOULD.**

**pellucida, PFEIFFER.**

**Strophia incana, BINNEY.**

**Holospira Römeri, PFEIFFER.**

Pfeiffer says "allied to *Goldfussi*, but from all species easily recognized by the basal carina of the last whorl, and its singular twist, which at first sight gives a sinistral appearance to the shell."

**Holospira Goldfussi, MENKE.**

**Stenogyra octonoides, D'ORB.**

**subula, PFEIFFER.**

**gracillima, PFEIFFER.**

**Cæcilianella acicula, MÜLLER.**

**Liguus fasciatus, MÜLLER.**

See p. 435 of Manual of American Land Shells for still another variety of coloring of this species.

**Orthalicus undatus, BRUGUIÈRE.**

**Succinea Concordialis, GOULD.**

**luteola, GOULD.**

**effusa, SHUTTLEWORTH.**

**Salleana, PFEIFFER.**

**campestris, SAY.**

**Veronicella Floridaana, BINNEY.**

**Onchidium Floridanum, DALL.**

See Plate VI. Figs. B, C, for a drawing of an original specimen, enlarged three times.

To Mr. Hemphill is due the credit of adding this genus to the fauna of Eastern North America. The specimens arrived as this paper is going through the press, and a detailed description must be deferred. The following notes, however, will indicate its external characters:—

When living, the creature is of a uniform slaty blue, the under parts bluish white, with a greenish tinge to the veil. The surface appears beautifully smooth and velvety without dorsal tubercles; just within the slaty margin of the mantle is a single row of about (in all) one hundred whitish elongated tubercles. When crawling, it is of an oval shape, about an inch long, and two tentacles extend forward beyond the mantle margin, resembling the oculiferous ones of *Vaginula: Floridanus*. In spirits the surface is still smooth, but numerous circular hardly elevated domelets cover the back, each appearing to contain one of the dorsal eyes described by Semper. The tentacles are entirely retracted; a narrow veil, with lightly scalloped edge, precedes the head; the muzzle is not prominent, is indented in the middle, and puckered at the edges. The foot is about one third wider than the mantle at each side of it. There is no jaw. The penis resembles that of *Siphonaria* in form and position. The animal exudes very little mucus. It was found on rocks between tides associated with *Chiton piceus*. Fifteen specimens were found at Knight's Key by Hemphill.

*Onchidium indolens* of Couthouy (Rio) and *O. armadillo* of Mörch differ from the above in coloring. The latter, described from St. Thomas, has a very different dorsal surface. No others are known from East America. It would seem as if the small Northern species, possessing a jaw like *O. boreale*, Dall, and *O. Celticum*, Cuvier, might appropriately be separated from the agnathous tropical forms as a subgenus, for which the name of *Onchidella* might be revived in a restricted sense.

The above description is by Dall (Proc. U. S. Nat. Mus., 1885, p. 288). Specimens received by him have the lingual dentition of the genus. (See my Plate III. Fig. 10, where a central tooth and adjacent lateral are given.) There are numerous rows of over 97-1-97 teeth.

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The following are to be added to the species treated in the Second Supplement.

## PACIFIC PROVINCE SPECIES.

**Microphysa Stearnsi, BLAND.****Lansingi, BLAND.**

It must be borne in mind that the other species of *Microphysa* examined by me have quadrate marginal teeth, while *Stearnsi* and *Lansingi* have the aculeate marginal teeth of the *Vitrinine*. Thus they can hardly be classed in *Microphysa*. The name *Pristina* has been suggested by Ancey (Conchologists'

Exchange, I. 5, p. 20, Nov., 1886). As a substitute for this preoccupied name, Mr. Pilsbry suggests *Anceya*. (See same, I. 6, p. 26, Dec., 1886.) Mr. Ancey's description is:—

*Pristina*, Anc. (nov. subg. *Hyalinæ*). Testa parvula, imperforata, cornea, nitens, multispinata; spira depresso conica. Apertura interdum lamellis radiantibus subserratis in palato sitis insignis.

Geographical Distribution: Western and Arctic North America.

Types: *Hyalina Stearnsi*, Bland, and *Lansingi*, Bland.

Mr. W. G. Binney put these species, but with doubt, in *Microphysa*, while other authors consider them as *Hyalinæ*; they differ from the latter by anatomic features, and from the former by the form of the shell. Altogether I am inclined to place the group in *Hyalina*, as a series nearly allied to *Conulopolita*, Boettger (type, *C. Raddei*, Boettg.); I am confident the presence or absence of internal laminae or tooth-like processes within the aperture of *Helices* are not generic characters; in some instances they are either present or absent in closely allied species. I established this fact when at work (*Le Naturaliste*, 1882) on the New Caledonian forms, and I now repeat this as my opinion in regard to *Pristina* and *Gastrodonta*. In the latter the teeth are frequently absorbed by the animal when growing larger.

### *Macrocyclus Duranti*, Newc.

To the synonymy add:—

*Selenites cœlatura*, MAZYCK, Proc. U. S. Nat. Mus., 1886, p. 460, with figures of that form and of typical *Duranti*. Also, Proc. Elliott Soc., Feb., 1886, p. 114, same figures.

Mr. Mazyck's description and figures are repeated here:—

Shell small, depressed, brownish horn-color, with very coarse, rough, crowded, sub-equidistant, irregular ribs, which are obsolete at the apex; whorls four, rounded, somewhat inflated below, gradually increasing, the last not descending at the aperture; suture impressed; umbilicus wide, clearly exhibiting all of the volutions; aperture almost circular, slightly oblique; peristome simple, its ends approaching and joined by a very thin, transparent, whitish callus, through which the ribs are distinctly seen. Greater diameter, 4 mm.; height,  $1\frac{1}{2}$  mm.

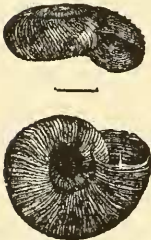
Santa Barbara, California, Dr. L. G. Yates. Hayward's, Alameda County, California, W. H. Dall, U. S. National Museum.

Newcomb's description of this little shell (*M. Duranti*) is as follows:—

"Shell depressed, discoidal, pale corneous, under the lens minutely striated, opaque, broadly and perspectively umbilicated; whorls 4, the last shelving but not descending (at the aperture); suture linear; aperture rounded, lunate, lip simple, the external and internal approaching.

"*Habitat*.—Santa Barbara Island."

Mr. Binney's description, which is repeated in each of his works above named, differs in this important particular. For Newcomb's "Under the lens minutely striated," he substitutes the contradictory words "with very coarse, rough striae."



*Macrocyclus Duranti*,  
var. *cœlata*,  
enlarged.

In a note written in answer to an inquiry addressed to him regarding this singular discrepancy, he says, "My description and figure are from an individual, not from the species. I am absolutely sure my specimen was one of the original find." His figure, drawn by Morse, rather represents a comparatively smooth, semi-transparent shell.

### *Limax hyperboreus.*

See Manual of Amer. Land Shells, p. 473. I have figured on Plate VIII. Fig. F, an individual from British Columbia. Here I give the dentition.

Jaw arched, smooth, with blunt median projection. Lingual membrane with 42-42 teeth; centrals tricuspid; laterals bicuspid, 12 in number on each side; marginals about 30 on each side, aculeate, simple, without bifurcation or side spur.

The figure shows a central tooth with its adjacent lateral, and three extreme marginals.

*Limax montanus*, *L. castaneus*, *L. occidentalis*, and *L. campestris* all have side spurs to their marginal teeth. Otherwise, their dentition shows no specific distinction from that of *hyperboreus*. Until the genitalia of the last is shown to vary, I am inclined to believe all four to be one and the same species.



*Limax hyperboreus*

### *Limax Hemphilli.*

Mr. Henry Hemphill has sent me in spirits from Julian City, California, a small, slender, smooth, dark species of *Limax*, 20 mm. long in its contracted state. It does not outwardly resemble *Limax agrestis*, nor does it seem probable that that species would have been accidentally introduced from the Eastern cities.<sup>1</sup> The dentition, however, agrees with that of *agrestis* by its having the peculiar side spur to the larger cutting point of all the lateral teeth. I venture to propose a specific name for it, in hopes of having an opportunity later to fix its specific position by an examination of the genitalia. It is figured on Plate VIII. Fig. E.

The jaw is as usual in the genus.

There are 50-50 teeth to the lingual membrane, of which ten on each side are laterals. Centrals tricuspid; laterals bicuspid, the larger cutting point having a well developed side cutting point on its inner side; the laterals have also an inner, slightly developed, horizontal side cusp, bearing a small, stout cutting point (see Plate I. Fig. 13); marginals simple, without side spur.

The figure on Plate II. Fig. 3, shows one central with its adjacent laterals, an outer lateral, and several extreme marginals.

A specimen, apparently of the same species, from British Columbia, has 53-53 teeth, of which 13 on each side are laterals.

I have the same species, with similar dentition, from San Tomas, Lower California (Hemphill).

<sup>1</sup> It is, however, found in San Francisco

**Limax Hewstoni, J. G. COOPER.**

On Plate II. Fig. 4, will be found a better figure of the dentition of this species than is given in Terr. Moll., V. It will be seen that the inner side cusp of the lateral teeth is quite distinct from the side spur found in *Limax Hemphilli* and *agrestis*. (See line third of p. 223.)

I have figured (Plate VIII. Figs. D and I) individuals received from Dr. Cooper, drawn by Mr. Theo. D. A. Cockerell.

**Limax campestris, var. occidentalis.**

The specimen figured on Plate VIII. Fig. H, was kindly furnished by Dr. Cooper. I have already expressed my belief in the identity of this with the Eastern form.

**Arion foliolatus, GOULD.**

It is with the greatest pleasure that I announce the rediscovery by Mr. Henry Hemphill of this species, which has hitherto escaped all search by recent collectors. It has till now been known to us only by the description and figure of the specimen collected by the Wilkes Exploring Expedition, almost fifty years ago, and given in Vols. II. and III. of Terrestrial Mollusks. A single individual was found in December, 1889, at Olympia, Washington, and sent to me living by Mr. Hemphill. It can thus be described. (See Fig. A of Plate VIII.)

Animal in motion fully extended over 100 millimeters. Color a reddish fawn, darkest on the upper surface of the body, mantle, top of head, and eye-peduncles, gradually shaded off to a dirty white on the edge of the animal, side of foot, back of neck, and lower edge of mantle, and with a similar light line down the centre of back; foot dirty white, without any distinct locomotive disk; edge of foot with numerous perpendicular fuscous lines, alternating broad and narrow; mantle minutely tuberculated, showing the form of the internal aggregated particles of lime, the substitute of a shell plate, reddish fawn color with a central longitudinal interrupted darker band and a circular marginal similar band, broken in front, where it is replaced by small, irregularly disposed dots of same color; these dots occur also in the submarginal band of light color. Body reticulated with darker colored lines, running almost longitudinally, scarcely obliquely, toward the end of the tail, and connected by obliquely transverse lines of similar color, the areas included in the meshes of this network covered with crowded tubercles, as in *Prophysaon Andersoni*, shown in Plate IX. Figs. I, J. Tail cut off by the animal. (See page 207.)

What appears to be the same species, or a very nearly allied one, was found by Mr. Hemphill at Gray's Harbor, Washington, on the banks of the Chehalis River, near its mouth. This form is figured on Plate VIII. Fig. C. When extended fully, it is 70 millimeters long. It is more slender and more pointed



at the tail than the large form. The body is a bright yellow, with bluish black reticulations. The edge of the foot and the foot itself are almost black; shield irregularly mottled with fuscous; the body also is irregularly mottled with fuscous, and has one broad fuscous band down the centre of the back, spreading as it joins the mantle, with a narrower band on each side of the body. The other characters, external and internal, are given below. This smaller form loses its colors on being placed in spirits, becoming a uniform dull slate color.

The large Olympia form is surely *Arion foliolatus*, Gould, agreeing perfectly with his description in Vol. II., and with his figure in Vol. III., excepting that the latter is colored with a deeper red.

Mr. Hemphill writes of it: "I have to record a peculiar habit that is quite remarkable for this class of animals. When I found the specimen, I noticed a constriction about one third of the distance between the end of the tail and the mantle. I placed the specimen in a box with wet moss and leaves, where it remained for twenty-four hours. When I opened the box to examine the specimen, I found I had two specimens instead of one. Upon examination of both I found my large slug had cut off his own tail at the place where I noticed the constriction, and I was further surprised to find the severed tail piece possessed as much vitality as the other part of the animal. The ends of both parts at the point of separation were drawn in as if they were undergoing a healing process. On account of the vitality of the tail piece, I felt greatly interested to know if a head would be produced from it, and that thus it would become a separate and distinct individual." The animal on reaching me still plainly showed the point of separation from its tail. (See Plate VIII. Fig. A.) The tail piece was in an advanced stage of decomposition. I noticed the constriction towards the tail in one of five individuals of *Prophysaon cœruleum* from Olympia. (See page 209.) Another individual of the same lot had a truncated tail, having undergone the operation. The edges of the cut were drawn in like the fingers of a glove.

The tail of the *Arion foliolatus* having been cut off, I was unable to verify the presence of a caudal pore from this individual. On the only living one of the lot from Gray's Harbor, the pore was distinctly visible, and is figured on Plate VIII. Fig. C. Usually, it seemed more "a conspicuous pit" than a longitudinal slit, as in *Zonites*. At one time I distinctly saw a bubble of mucus exuding from it. It opened and shut, and is still plainly visible on the same individual, which I have preserved in alcohol and added to the Binney Collection of American Land Shells in the National Museum at Washington. Another individual from Seattle plainly shows the pore.

Five specimens of the Gray's Harbor lot had, concealed in the mantle, a group of particles of white limy matter which it was impossible to remove as one shell plate. In the large Olympia individual these irregularly disposed particles of lime, of unequal size, seemed attached to a transparent membranous plate. With care, I removed this entire, and figure it. It is suboctagonal in shape (Plate VIII. Fig. B). Under the microscope it appears that the par-

ticles of lime do not cover the whole plate; at many points they are widely separated. This aggregation of separate particles is the distinctive character of the subgenus *Prolepis*, to which *A. foliolatus* belongs.<sup>1</sup>

The genitalia of the large individual from Olympia is figured on Plate IX. Fig. D. The ovary is tongue-shaped, white, very long and narrow; the oviduct is greatly convoluted; the testicle is black in several groups of cœca; the vagina is very broad, square at the top with the terminus of the oviduct, and the duct of the genital bladder entering it side by side; the genital bladder is small, oval, on a short narrow duct; the penis sac is of a shining white color, apparently without retractor muscle; it is short, very stout, blunt at the upper end where the extremely long vas deferens enters, and gradually narrowing to the lower end. There are no accessory organs. The external orifice of the generative organs is behind the right tentacle.

The form from Gray's Harbor (Plate IX. Fig. H) has its generative system very much the same as described above. The ovary is much shorter and tipped with brown, and is less tongue-shaped. The penis sac tapers to its upper end. The vagina is not squarely truncated above. The system much more nearly resembles that of *Prophysaon Andersoni* (see Terr. Moll., V.) than that of the Olympia *foliolatus*.

The jaw of both forms is very low, wide, slightly arcuate, with ends attenuated and both surfaces closely covered with stout, broad separated ribs, whose ends squarely denticulate either margin. There are about 16 of these ribs in one specimen from Gray's Harbor, and over 20 in that of the true *foliolatus* from Olympia (see Plate IX. Fig. B). The lingual membrane in each form is long and narrow, composed of numerous longitudinal rows of about 50-1-50 teeth, of which about 16 on each side in the true *foliolatus* (Plate IX. Fig. C), and 19 in the other form, may be called laterals. Centrals tricuspid, laterals bicuspid, marginals with one long inner stout cutting point, and one outer short side cutting point. The figure shows a central tooth with its adjacent first lateral, and four extreme marginals.

I have figured both the true *foliolatus* from Olympia (Plate VIII. Fig. A) and the smaller form from Gray's Harbor (Plate VIII. Fig. C) of natural size. Should the latter prove a distinct species or variety, I would suggest for it the name of *Hemphilli*, in honor of the discoverer of it and the long lost *foliolatus*.

### **Prophysaon Hemphilli.**

See Plate VII. Fig. D, drawn by Cockerell from the living animal.

### **Prophysaon Andersoni, J. G. COOPER.**

Figure 1 of Plate III. was drawn from a specimen received from Dr. Cooper. It represents the true *Andersoni*, distinguished by a light dorsal band, and by genitalia such as I have described for *P. Hemphilli*. The same form, also re-

<sup>1</sup> Mr. Theo. D. A. Cockerell, finding the slug not to be a true *Arion*, is about to suggest for it the generic name of *Phenacarion*.

ceived from Dr. Cooper, is drawn by Mr. Cockerell on Plate VII. Fig. C. Mr. Cockerell has shown me that I have confounded with it another species, which he proposes to call *P. fasciatum*. See next species.

#### *Prophysaon fasciatum*, COCKERELL.

This species is described by Mr. Cockerell as distinct from *Andersoni*, with which I have formerly confounded it. (2d Suppl. to Vol. V., p. 42.) It has a dark band on each side of the body, running from the mouth to the foot. To this must be referred the descriptions of animal, dentition, jaw, and genitalia formerly published by me as of *Andersoni*.

I am indebted to Mr. Theo. D. A. Cockerell for a figure and description of this species. The former is given on Plate VII. Fig. A, while the latter is given here in the words of Mr. Cockerell, whose name must consequently be associated with it as authority:—

Length (in alcohol), 19 mm. Mantle black, with indistinct pale subdorsal bands, — an effect due to the excessive development of the three dark bands of the mantle. Body with a blackish dorsal band, commencing broadly behind the mantle and tapering to tail, and blackish subdorsal bands. No pale dorsal line. Reticulations on body squarer, smaller, more regular, and more subdivided than in *P. Andersoni*, Cooper. Penis sac tapering, slender. Testicle large. Jaw ribbed.

#### *Prophysaon cœruleum*, COCKERELL.

##### Plate VIII. Fig. I, J.

In the Nautilus, 1890, p. 112, it is thus described:—

Length (in alcohol),  $22\frac{1}{2}$  mm.; in motion, 43 mm. Body and mantle clear blue-gray, paler at sides, sole white. Mantle finely granulated, broad, without markings. Length of mantle, 7 mm.; breadth, 5 mm. Respiratory orifice,  $2\frac{1}{2}$  mm. from anterior border. Body subcylindrical, tapering, pointed. (In one specimen eaten off at the end.) Distance from posterior end of mantle to end of body,  $10\frac{3}{4}$  mm.

The reticulations take the form of longitudinal equidistant lines, occasionally joined by transverse lines, or coalescing. Sole not differentiated into tracts. Jaw pale, strongly ribbed. Liver white.

Mr. Binney sends me colored drawings of the living animal; the neck is long and white, or very pale. Mr. Binney has examined the jaw and lingual, and finds them as usual in the genus.

Several specimens were sent from Olympia, Washington, by Mr. Hemphill to Mr. Binney.

*P. cœruleum* is an exceedingly distinct species, distinguished at once by its color and the character of its reticulations.

#### *Prophysaon cœruleum*, var. *dubium*, n. var., COCKERELL.

Length (in alcohol), 8 mm. Length of mantle, 4 mm. Distance from posterior end of mantle to end of body,  $3\frac{1}{2}$  mm. Mantle broad, with four bands composed of coalesced black marbling, very irregular in shape, and running together anteriorly. Body dark, tapering. Sole pale, its edges gray. Liver white.

With the *P. cæruleum* is a small dark slug, probably a variety of it, but differing as described above. It will easily be distinguished by its blackish color and the peculiar markings on the mantle.

### Prophysaon Pacificum, COCKERELL.

#### Plate VII. Figs. B, E, F, H.

Mr. Theo. D. A. Cockerell gives the following in the Nautilus of February, 1890, pp. 111-113 :—

Length (in alcohol),  $17\frac{1}{2}$  mm. Body and mantle ochrey brown, head and neck gray. Mantle granulated, rather broad, with a black band on each side not reaching the anterior border; these bands are farthest ( $2\frac{1}{4}$  mm.) apart near the respiratory orifice, from which point they converge posteriorly, and anteriorly by the bending of the band on the right side. Length of mantle,  $7\frac{3}{4}$  mm.; breadth, 4 mm. Respiratory orifice  $3\frac{1}{4}$  mm. from anterior border. Body cylindrical, rounded and very blunt at end, not conspicuously tapering. Distance from posterior end of mantle to end of body, 8 mm. Body dark grayish-ochre above, with an indistinct pale dorsal line; sides paler. Reticulation distinct, with indistinct "foliations." Sole somewhat transversely wrinkled, but not differentiated into tracts.

Jaw dark, strongly curved, blunt at ends, with about ten well-marked ribs (Plate VII. Fig. F). Lingual membrane with about 35-1-35 teeth; centrals tricuspid, the side cusps very small, laterals bicuspid, marginals with a large sharp straight inner point and a small outer one. Compared with *P. humile* the centrals are slightly shorter and broader. Liver dark gray-brown.

Found by Mr. H. F. Wickham under logs in ditches by the roadside and damp places at Victoria, Vancouver Island, 1889.

This is a very distinct species, easily recognized by its color, the absence of dark bands on the body, the pale dorsal line, and the blunt posterior extremity.

### Prophysaon flavum, COCKERELL.

#### Plate VII. Fig. K.

From the Nautilus, 1890, p. 111:—

Length (in alcohol), 25 mm. Body and mantle dull ochreous, head and neck ochreous. Mantle tuberculate-granulose, grayish ochre, pale at edges, and with black marbling or spots in place of the bands of *P. Pacificum*. Length of mantle, 11 mm.; breadth,  $5\frac{1}{2}$  mm. Respiratory orifice 5 mm. from anterior border. Body cylindrical, hardly tapering, and blunt at end. Distance from posterior end of mantle to end of body, 14 mm. Body dark grayish-ochre above, with a pale ochreous dorsal line not reaching much more than half its length; sides paler. Reticulations distinct, "foliated." Sole with well marked transverse lines or grooves, those of either side meeting in a longitudinal median groove, which divides the foot into two portions. Liver pale grayish.

Uniform tawny, as is *Limax flavus*. It stretches itself out in a worm-like shape unlike other species. Internal shell plate, jaw, and tongue as in *Andersoni*.

Gray's Harbor, Washington. (Hemphill, 1889.)

This is probably a variety of *P. Pacificum*.

**Prophysaon humile**, COCKERELL.

Plate VII. Figs. F, G, L, M.

From Nautilus, 1890, p. 112.

Length (in alcohol),  $16\frac{1}{2}$  mm. Body above and mantle smoke-color, obscured by bands. Mantle wrinkled, and having a broad dorsal and two lateral blackish bands, reducing the ground-color to two obscure pale subdorsal bands. Length of mantle, 7 mm.; breadth,  $5\frac{1}{2}$  mm. Respiratory orifice  $2\frac{3}{4}$  mm. from anterior border. Body subcylindrical, somewhat tapering, rather blunt at end. Distance from posterior end of mantle to end of body, 8 mm. Back with a blackish band reaching a little more than half its length, and lateral darker blackish bands reaching its whole length. Reticulations distinct, "foliated." Sole strongly transversely striate-grooved, but not differentiated into tracts.

Jaw pale, strongly striate, moderately curved, not ribbed. (See Fig. F.) Lingual membrane long and narrow. Teeth about 35-1-35. Centrals tricuspid, laterals bicuspid, marginals with a large inner point, and one (sometimes two) small outer points. Liver pale chocolate.

Found by Mr. H. F. Wickham under the bark of rotten logs in the woods around Lake Cœur d'Alene, Idaho, 1889.

In its reticulations, and general external characters, this species resembles *P. Andersoni*, of which it is possibly a variety.

**Hemphillia glandulosa**.

(See also p. 216.)

From Olympia and Gray's Harbor, Washington, Mr. Hemphill sent me living specimens of this species, both young and mature. Several of the young had the horn-shaped process to the tail noticed in the original description of the genus. The shell in these young individuals is very slightly attached, apparently simply by having its posterior margin lightly covered by the mantle. It often becomes detached. In these young, the mantle is proportionally smaller, and the neck much longer. I have figured an enlarged view of a young individual, Plate IV. Fig. D.

**Ariolimax**<sup>1</sup> **Columbianus**, GOULD.

Found also by Mr. Hemphill on Santa Cruz Island.

Plate VI. Fig. A, represents the mottled variety, found recently by Mr. Hemphill in the State of Washington. Mr. Cockerell suggests for it the varietal name *maculatus*. This form shares with the type the peculiar penis sac (Fig. G) distinguishing it from the next species.

**Ariolimax Californicus**, COOPER.

See Plate V. Fig. E, for the animal in motion, and a portion of the genital system (Fig. H), showing variation from that of *A. Columbianus*.

<sup>1</sup> The name should be *Arionilimax*.

**Ariolimax Andersoni.**

See Plate V. Fig. F, showing the typical specimen in spirits restored.

**Ariolimax Hemphilli.**

Plate V. Fig. B, G.

A variety *maculatus*, Cockerell, is figured in B. The Figure G is drawn from a typical specimen, with the tail, the pore, and the locomotive disk.

**Ariolimax niger, J. G. COOPER.**

Plate V. Fig. A, gives a lighter-colored form ; Fig. I, the typical form ; Figs. C and D, the caudal pore.

**Triodopsis inflecta, SAY.**

This has erroneously been quoted from the Pacific Province, at the mouth of Columbia River. It is difficult to decide what species Middendorff had in view. His words are thus translated :—

Let it not be objected that *Helix clausa* up to this time has not been discovered west of the Rocky Mountains. The Northwest Coast of America is almost wholly unexplored conchologically, and I do not doubt that *H. clausa* will be there found, just as I can now assert with reference to *H. planorboides*. Even the American authors know this hitherto only from the Ohio and Missouri. Its distribution nevertheless appears to extend over the whole of North America, since I have received a great number of specimens of the same through Mr. —, from Sitka, whereby it becomes incorporated with our Russian Fauna. Southwards it extends to the west coast of America, at least to Upper California, where they were likewise collected by Mr. —. It appears to have undergone no alteration whatsoever, and presents in Sitka a considerable size, as the ordinary representations show (up to 22, etc.). Moreover, Binney in the Boston Journal, III., Plate XIV., has them copied equally large.

**Polygyra Roperi, PILSBRY.**

Shell umbilicated, plane above, slightly inflated below, shining, pellucid, light horn-color, with delicate wrinkles of growth ; spire flattened ; whorls  $5\frac{1}{2}$ , scarcely rounded, very regularly increasing, the last flattened above, abruptly deflected at the aperture, deeply constricted behind the peristome ; aperture transversely lunar, gaping, much contracted, tridentate ; peristome thickened, broad, white, gradually thinning and scarcely reflected at its edge, and not extending beyond the surface of the whorl, its ends approached, joined by a light callus, on which is a heavy white callus bearing a stout, white, broad, blunt, transverse tooth, slightly curving inward, its basal margin with an erect conical, short tooth, separated by a small circular sinus from another rather more deeply seated similar tooth on its upper margin. Umbilicus broad,



Polygyra Roperi,  
enlarged.

showing the volutions clearly. Greater diameter, 9 mm. ; lesser, 7 mm. ; height,  $2\frac{1}{2}$  mm.

*Helix (Triodopsis) Roperi*, PILSBRY. *The Nautilus*, Vol. III. No. 2, June, 1889, p. 14.

Redding, Shasta Co., California, in drift of the Sacramento River, three dead shells were collected by Mr. Edward W. Roper, of Chelsea, Mass.

The above description is drawn from one of the original specimens, kindly lent me by Mr. Roper, while another in the collection of the Academy of Natural Sciences of Philadelphia, from which Mr. Pilsbry drew his description, is figured above. The third specimen was given by Mr. Roper to Mr. Henry E. Dore of Portland, Oregon.

Never having seen a specimen of *P. Harfordiana*, I cannot say if this species is identical with it. At least, it must be nearly allied.

#### *Aglaja fidelis*, GRAY.

New figures of several forms of this species are given. Plate X. Fig. A represents the black elevated form approaching *infumata*. Its sculpturing is given in Fig. B. The small, black, elevated form is given in Fig. C, with its sculpturing in D ; the small, depressed form, in E.

#### *Aglaja infumata*, GOULD.

Plate X. Fig. F, gives an enlarged view of the hirsute surface.

#### *Arionta arrosa*, GOULD.

Plate XI. Fig. A gives this species. A form of *arrosa* nearly approaching *A. exarata* is given in Fig. B, its sculpturing in Fig. C.

#### *Arionta exarata*, PFEIFFER.

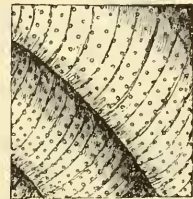
The typical form and its sculpturing are given on Plate XI. Figs. D and E.

#### *Arionta Mormonum*, PFEIFFER.

The typical form is given on Plate XI. Fig. F. The variety (Vol. V. p. 141) approaching *Aglaja Hillebrandi*, is given in Figs. G and H ; the sculpturing of the same form, on Plate X. Fig. G. The genitalia of this form are the same as of the type.

#### *Arionta sequoicola*, J. G. COOPER.

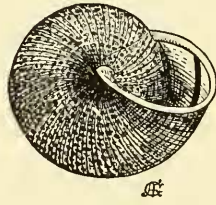
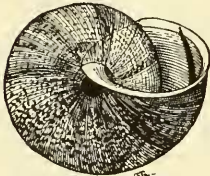
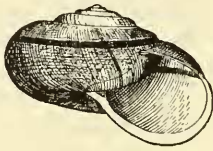
A figure of the sculpturing of this species is here given, greatly enlarged.



Enlarged sculpturing of *Arionta sequoicola*.

**Arionta Californiensis, LEA.**

I give here new figures of two forms of this species, *Arionta Diablocensis* and the depressed variety of *A. Bridgesi*, the former drawn from a shell received from Dr. Cooper.

*Arionta Diablocensis*.*Arionta Bridgesi*, depressed.**Onchidella Carpenteri, DALL.**

An alcoholic specimen received from Mr. Dall is figured on Plate VI. Figs. D, E, enlarged twice.

**Veronicella olivacea, STEARNS.**

I have failed to receive Californian specimens. That figured on Plate IX. Figs. E, F, is one of the original lot from Folvon, Central America.

## CENTRAL PROVINCE SPECIES.

**Limax montanus, INGERSOLL.**

A specimen is figured on Plate VIII. Fig. G.  
The species is surely identical with *L. campestris*.

**Patula solitaria, SAY.**

Mr. Hemphill found this species very abundant at Old Mission, Cœur d'Alene, Idaho. There was an albino variety, a depressed form, and one very much more elevated than that which I figured in the Second Supplement, Plate I. Fig. 10.



**Patula strigosa.**

Among the shells recently collected by Mr. Hemphill at Old Mission, Cœur d'Alene, Idaho, was a marked variety of this species, for which Mr. Hemphill suggests the name *subcarinata*. The specimens vary greatly in elevation of the spire, and in the number and disposition of the revolving bands, often quite wanting. All have a very heavy shell, the body whorl of which has an obsolete carina which is well marked at the aperture, modifying the peristome very decidedly. See the figure.



*P. strigosa*, var. *subcarinata*,  
Hemphill.

In examining the genitalia I find the base of the duct of the genital bladder greatly swollen along a fifth of the total length of the duct.

On the banks of the Salmon River, Idaho, Mr. Hemphill found a form like var. *Gouldi*, but distinctly carinated. None of the Utah individuals of this form are so characterized.



*Patula strigosa*, var. *jugalis*,  
Hemphill.

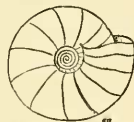
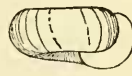
Another form of *strigosa* from the same locality is very large, flat, with a transversely oval aperture, the ends of the peristome so nearly approached as almost to touch, and often joined by a heavy callus, which forms a continuous rim around the aperture. Mr. Hemphill has called this var. *jugalis*.

**Microphysa pygmæa.**

Found by Mr. Hemphill at Old Mission, Cœur d'Alene, Idaho.

**Microphysa Ingersolli**, BLAND.

A better figure of this species is here given.



*Microphysa Ingersolli*,  
enlarged.

**Triodopsis Hemphilli.**

Mr. Tryon has suggested the name *binominata* for this species, though *Hemphilli* is not preoccupied in *Triodopsis*.



*Triodopsis Sanburni*,  
enlarged.

**Triodopsis Sanburni.**

The cut is drawn from one of the original specimens.

**Mesodon ptychophorus.**

At Old Mission, Cœur d'Alene, Idaho, Mr. Hemphill found a form of this species characterized by a heavy, dead white shell with scarcely any trace of ribs or wrinkles of growth which are usually so characteristic of the species. On the banks of the Salmon River he found a small form, the lesser diameter of which is only 12 mm. See figure.



*Mesodon ptychophorus*,  
var.

### Triodopsis Harfordiana.

Ancey suggests *commutanda*, and Tryon *Salmonensis*, as a substitute for the name *Harfordiana*. I retain the last name, it not being preoccupied in the genus *Triodopsis*.

### Prophysaon Andersoni?

Specimens collected by Mr. Hemphill at Old Mission, Cœur d'Alene, Idaho, appear to agree with specimens of this species received from Dr. Cooper. The jaw is low, wide, slightly arcuate, with over 12 broad, stout ribs, denticulating either margin. The lingual membrane is given in Plate II. Fig. 2. The central and lateral teeth are slender and graceful. The latter have, apparently, a second inner cutting point, as is found in *Limax agrestis*. I have so figured it, hoping to draw attention to it, and thus settle the question of its being there.

### Hemphillia.

#### Plate IV.

From Old Mission, Cœur d'Alene, Idaho, Mr. Henry Hemphill has sent me fine large specimens of *Hemphillia* alive. From these I am able to give the outward characteristics of the animal in drawings by Mr. Arthur F. Gray.

The animals are larger and much lighter in color than those originally found at Astoria. They do not while in motion differ from other slugs, though my former figure of the animal in spirits shows a very great difference, owing to the contraction being resisted by the internal shell. The rear end of the mantle seems swollen and blunt, separated from the back, however, and thus alone does there seem to me any difference in its appearance from *Limax*, whose mantle lies flat upon the back. The slit in the mantle is sometimes open, sometimes closed, and the slit seems to extend quite to the rear of the mantle. There is a profuse flow of mucus from over the slit. There seem on the mantle to be little protuberances, rather than the elongated reticulation of the rest of the animal. The caudal pore opens and shuts, and exudes mucus in bubbles sometimes, which occasionally form a solid lump of mucus on the tail. The horn-like process of the tail so prominent in the first specimens from Astoria—contracted in alcohol—does not exist in these living specimens, though occasionally there is a kind of hump above the pore. (See Plate IV. Fig. D.)

Mr. Hemphill writes: "*Hemphillia* has a peculiar habit when removed from its resting place of switching its tail, so to speak, quite rapidly,—a habit I never noticed in any of our other slugs. I find them hibernating in old rotten logs."

The viscera are enclosed under the mantle.

Mr. Gray in drawing the animal called my attention thus to the characters of the outward markings of the slug:—

"You are right in saying that the slit in the mantle extends to the back margin. The central pit seems flooded with mucus at all times, but does not change its form; the slit, however, seems to widen and show a little ridge on either margin when the animal is fully expanded. The little tubercles, or small pimples as it were, seem to cover the posterior portion of the mantle, while the elongated tubercles seem to cover the anterior half, though these at times disappear and the anterior portion runs into folds, which break up the surface, and starting from the margin of the mantle run to its centre in parallel lines like miniature waves. They move steadily inward from both margins, disappearing before reaching the little mucous pit in the centre of the mantle, little wavelets rising at the margins and keeping up a constant rhythmic motion toward the centre."

The jaw of this specimen has about 25 ribs, denticulating either margin. It is low, wide, slightly arcuate, with slightly attenuated ends. (See Plate IX. Fig. A.)

The lingual membrane is as described and figured by me in Vol. V.: there are, however, in this form, 57-1-57 teeth, with some eleven true laterals.

The genitalia I have figured in Plate III. Fig. 3. It agrees with my figures in Vol. V. of the genitalia of the original specimens, excepting that the penis sac, as represented there in Plate XII. Fig. K, is here doubled on itself.

#### **Pupa hordeacea, GABB.**

An authentic specimen of this species is figured in the Second Supplement, Plate III. Fig. 10, referred by mistake to *P. Arizonensis* in the explanation of Plate III.

#### **Pupa Arizonensis, GABB.**

The reference to *hebes* in Second Supplement should be Fig. 12, not Fig. 10.

### LOCALLY INTRODUCED SPECIES.

#### **Tachea nemoralis, LINN.**

Fine large specimens of this species have been sent me by Prof. James H. Morrison, found by him living during the last three years at Lexington, Virginia. They form part, no doubt, of a colony descended from living individuals introduced from Europe around plants.

#### **Zonites cellarius, MÜLLER.**

Also at San Francisco (Cooper).

#### **Limax maximus, LINN.**

Also at New Braunfels, Texas (Singerly).

A drawing of the lingual dentition on Plate II. Fig. 1, shows the cutting points of central and lateral teeth to be trifid. This is not shown in my figure in Vol. V.

SINCE the foregoing was written, the following species have been described:—

### Zonites selenitoides, PILSBRY.

This species is similar in form and general appearance to *Z. minusculus*, Binn., though decidedly larger. The umbilicus is broad, as in the latter species. The shell is thin, light yellowish horn-color, almost white. Surface shining, covered with close strong oblique rib-striae, like *Patula striatella*; these striae, while generally regular, sometimes bifurcate, or separate to give room for another to be intercalated. The spire is flatter than *minusculus*, nearly plane. The earlier  $1\frac{3}{4}$  to 2 whorls are smooth, polished, not striate; the sutures are well impressed. There are  $3\frac{1}{2}$  whorls in all, convex, gradually widening, the last proportionately wider than in *Z. minusculus*. Aperture slightly oblique, lunate, narrower



Zonites selenitoides, enlarged.



Sculpturing, enlarged.

than in *Z. minusculus*, its margins thin, acute, scarcely converging, the columellar shortly subreflexed.

Alt. 1.2 mm., diam. 3 mm.

The specimens were presented to me by Mr. W. G. Binney, who, regarding them as new, kindly permitted me to describe them. They were gathered by Hemphill, prince of collectors! at Mariposa Big Trees, California. The name *selenitoides* is given because of a certain resemblance to the little *Scenites Duranti* of Southern California.

The above description was published by Pilsbry in Proceedings of Academy of Natural Sciences of Philadelphia, 1889, p. 413, Plate XII. Figs. 13-15.

I give a figure of the original specimen, and of its sculpturing.

### Zonites Simpsoni, PILSBRY.

This species belongs to that group of *Hyalina* comprising *capsella*, Gld., Lawæ, W. G. Binn., and *placentula*, Shutt.,—species with narrow umbilicus, numerous closely coiled narrow whorls, and without a callus or thickening within the base of the last whorl. *Z. Simpsoni* differs from *placentula* in its much smaller size, nearly straight, instead of arcuate, basal lip, seen from beneath, proportionately wider last whorl, and the more trigonal, wider aperture. With *Z. Lawæ* I need not compare it, as that species is much larger and more elevated. *Z. capsella* is about the same size, color, and texture as *Simpsoni*, but has a narrow umbilicus and very much narrower aperture, narrowly semilunar instead of trigonal in outline. *Z. Simpsoni* has 5 whorls. Alt. 2, diam. maj.  $4\frac{1}{2}$ , min. 4 mm.

The specimens before me were collected by Mr. C. T. Simpson, at Limestone Gap, Indian Territory. The trigonal form of the aperture is so peculiar that the species may be separated from *Z. capsella* at a glance. My comparisons were made with specimens of *capsella* received from Gould, and *placentula* from W. G. Binney. The figures are camera lucida drawings.

From Proc. Acad. Nat. Sci. Phila., 1889, p. 412, Plate XII. Figs. 8-10.

*Pupa calamitosa*, PILSBRY.

Shell minute, cylindrical, very blunt at apex, chestnut-colored; whorls  $4\frac{1}{2}$ , the first one and a half smooth, the following regularly costulate striate, the costulae separated by spaces wider than themselves; last whorl abruptly turning forward, rounded beneath, encircled by a slight central constriction or furrow; aperture about one third the total length of shell, rounded, truncated above, contracted within; peristome thin, expanded, without crest or callous thickening behind; columellar margin rather dilated; parietal wall bearing two entering lamellæ, one arising near the termination of the outer lip, the other more deep seated, elevated, entering less obliquely; columella with a strong white deep-seated obliquely entering fold; outer lip with two short white lamellæ.

Alt. 1.70, diam. 0.80 mm.

Two trays of this tiny species are before me. One received from Henry Hemphill, collected near the mouth of San Tomas River, Lower California, the other collected by Orcutt near San Diego, California. Most specimens show the widening inward of the outer lip shown in the figure. Several specimens have only one lamella on the outer lip, and are rather larger than the typical form described, measuring 1.90 mm. alt. The second parietal lamella is usually much larger than the first, but in one or two specimens before me this is not the case. The umbilical rimation terminates in a tiny depression, perhaps minutely perforated at the axis. The formula of denticles or folds (according to Dr. Sterki's scheme<sup>1</sup>) AA B D E or AA B E. The species is of a decidedly different type from any known American *Pupa*. *P. hordacea*, *Californica*, and *Rowelli*, abundant Western forms, belong in quite diverse groups; the first being allied to *P. corticaria* and *pellucida*, the last two grouping with *P. decora*, *Rowelli*, and *corpulenta*.

From the *Pupæ* of the Mexican fauna, *leucodon*, *pellucida*, and *chordata*, the present species is quite distinct in every respect.

The inward continuation of the parietal and columellar folds is shown in Figure 17. They are white, regularly veined with darker, like polished plates of agate.

From Proc. Acad. Nat. Sci. Phila., 1889, p. 411, Plate XII. Figs. 16, 17.

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Mr. Hemphill sends me the following descriptions, which must be fully credited to him:—

*Helix tudiculata*, var. *Binneyi*.

This beautiful variety belongs to the globosely depressed forms of *H. tudiculata*, Binn. It is of a uniform greenish yellow color, without blotches or markings, except a very faint trace of a band at the periphery. *H. tudiculata* is very variable in form, size, and sculpture, and with the umbilicus either open or closed, but it is very constant in its dark chestnut-color in Southern California. North of Merced County, however, it becomes a shade lighter, and passes towards the light, thin form of *H. arrosa*, which I regard as the

<sup>1</sup> See Proc. U. S. Nat. Mus., 1888, p. 369. I have repeated the letter presenting the parietal fold, as the two seem to be of equal importance.

progenitor of *tudiculata*, *arrosa* in turn having evolved from its northern neighbor, *H. Townsendiana*, Lea, and *Townsendiana* from the form we now call *H. ptychophorus*, Brown, found in Eastern Oregon and Idaho.

Habitat. Mountains of San Diego County, California. Only one specimen found.

#### *Helicodiscus fimbriatus*, var. *Salmonensis*.

This variety varies from the Eastern or typical forms in the absence of the revolving lines; otherwise the shells are alike.

Habitat. Banks of Salmon River, Idaho, Old Mission, Idaho, and Oakland, California.

#### *Helix Kelletti*, var. *albida*.

This is a beautiful clear white translucent variety, with no markings or stains of any kind. It is quite thin and frail, and a trifle smaller than the average size of *Kelletti*.

Habitat. Santa Catalina Island, California. Two specimens only found by me.

#### *Helix Kelletti*, var. *castanea*.

Among the numerous patterns of coloring assumed by *H. Kelletti*, none are more conspicuous than this well marked variety. The body whorl is of a deep shiny chestnut-color above the periphery, and becomes lighter as it follows the whorls of the spire to the apex. The band at the periphery is quite variable in the different specimens; it is generally light, and well defined above, but below it is irregular and spreads over the base of the shell more or less.

Habitat. Santa Catalina Island, California. This variety is not rare.

#### *Patula strigosa*, var. *Buttonii*.

Shell umbilicated, elevated, or moderately depressed, nearly white, sometimes stained with light chocolate; whorls five, convex, with numerous oblique striae; suture impressed, aperture circular; peristome thickened, not reflected, darker than the body of the shell; extremities nearly approached and joined by a callus; with or without a basal tooth; tooth when present very variable, generally consisting of a single tubercle; in some specimens it is nearly or quite square, as high as long; in other specimens it is long and bifid.

Diameter of the largest specimen,  $\frac{7}{8}$  inch; height,  $\frac{1}{2}$  inch. Diameter of the smallest specimen,  $\frac{1}{2}$  inch; height,  $\frac{3}{8}$  inch.

Habitat. Box Elder Co., Utah.

I dedicate this interesting form of *strigosa* to my friend, Mr. O. Button, of Oakland, California.

**Selenites *Duranti*, var. *Catalinensis*.**

Shell widely umbilicate, depressed, white, transparent when fresh ; whorls 4, flattened above and below, with fine oblique striæ ; spire planulate ; aperture transversely rounded ; peristome simple, acute ; extremities approached and joined by a very thin callus in fully matured specimens.

Greatest diameter,  $\frac{1}{4}$  inch ; height,  $\frac{1}{16}$  inch.

Habitat. Santa Catalina Island, California.

My little shell differs from the typical *Duranti* in its greater size, smoother surface, broader umbilicus in specimens of the same size, but principally in its transparent shining surface. It is larger than the largest *Duranti* that I have seen, but not so large as the costate variety of that species described by Mr. Mazyck as distinct under the name of *S. calata*, which I have in my possession. My specimen of that species is larger than his measurements.

I can add the following to his locality : Los Angeles and San Diego, California, Point Abunda, and banks of San Tomas River, Lower California ; thus giving it a range of about two hundred miles up and down the coast. I have collected the typical *S. Duranti* at the following places : Etna Springs, Napa Co., Healdsburg, Sonoma Co., Bolinas and San Rafael, Marin Co., Oakland, Alameda Co., Santa Cruz, Monterey, Santa Barbara Island, Santa Catalina Island, and San Clemente Island, a range of over<sup>1</sup> one hundred miles north and south. It is confined to the Coast Range as far as we know at present.

## EXPLANATION OF THE PLATES.

## PLATE I

- Fig. 1. Central tooth of lingual membrane of *Mesodon major*, the specimen labelled A (see p. 190).
- Fig. 2. Central tooth, two adjoining lateral teeth, and two marginal teeth of lingual membrane of *Mesodon major*, the specimen labelled B (see p. 190).
- Fig. 3. Same: an outer lateral tooth bearing a side cusp and cutting point (see p. 190).
- Fig. 4. *Mesodon Andrewsii*: the genitalia.  
*ov.* oviduct.  
*g. b.* genital bladder.  
*d. g. b.* duct of same.  
*v. d.* vas deferens.  
*r.* retractor muscle of penis sac.  
*p. s.* penis sac.  
*or.* common orifice.  
*p.* prostate gland.
- Fig. 5. Penis sac of another specimen of same.
- Fig. 7. Lingual dentition of same, from specimen labelled E. Two central teeth, with an adjoining lateral tooth.
- Fig. 8. Same: marginal teeth.
- Fig. 9. Same: extreme marginal teeth.
- Fig. 10. Same: first lateral tooth of specimen labelled F (see p. 191).
- Fig. 11. Same: marginal tooth (see p. 191).
- Fig. 12. Same: specimen labelled M (see p. 191), an outer lateral tooth.
- Fig. 13. The fourth lateral tooth of *Limax Hemphilli* (see p. 205).
- Fig. 14. *Succinea chrysis*, Westerlund, copied from the "Vega Expedition," Plate III. Fig. 10.
- Fig. 15. *Succinea annexa*, Westerlund, copied from the same, Fig. 11.

## PLATE II.

Lingual dentition of:—

- Fig. 1. *Limax maximus*. A central tooth with two adjacent laterals; an outer lateral; two marginals, the left hand one the last.
- Fig. 2. *Prophysaon* (see p. 216). A central tooth with its adjacent lateral tooth; an outer lateral tooth; an extreme marginal tooth.



- Fig. 3. *Limax Hemphilli*. A central tooth with two adjacent laterals; an outer lateral tooth; two outer marginal teeth.
- Fig. 4. *Limax Hewstoni*. A central tooth with adjacent lateral on either side; incorrectly numbered on the plate; two extreme marginals.
- Fig. 5. *Microphysa dioscoricola* (see p. 196).

## PLATE III.

- Fig. 1. *Prophysaon Andersoni*, J. G. C., received from Dr. Cooper.
- Fig. 2. *Pupilla Floridana*, Dall, from original figure.
- Fig. 3. Genitalia of *Hemphillia*, from Old Mission, Cœur d'Alene, Idaho (see p. 217): —
- t. testicle.
  - ep. epididymis.
  - ov. ovary.
  - ovid. oviduct.
  - pr. prostate.
  - g. b. genital bladder.
  - d. g. b. duct of same.
  - v. d. vas deferens.
  - r. retractor muscle of penis.
  - p. s. penis sac.
  - or. common orifice.
- Fig. 4. *Helix exigua*, from an original drawing by Dr. Stimpson.
- Fig. 5. *Zonites lasnodon*, Phillips, enlarged. Drawn by Miss Helen E. Lawson.
- Fig. 6. Central portion of jaw of *Microphysa dioscoricola*, greatly enlarged.
- Fig. 7. *Bulinus Floridanus* (see p. 201). Drawn from original specimen in Mr. Cummings's collection, by G. B. Sowerby.
- Fig. 8. Lingual dentition of *Polygyra hippocrepis*.
- a. central and two lateral teeth.
  - b. marginal teeth.
- Fig. 9. *Bulinus Hemphilli*.
- Fig. 10. Dentition of *Onchidium Floridanum*.

## PLATE IV.

Fig. D was drawn by W. G. Binney, the other figures by Arthur F. Gray: all from life.

- Fig. A. *Hemphillia glandulosa*, twice the natural size.
- Fig. B. The same; animal in motion, natural size; the slit on the mantle partially open.
- Fig. C. The same; partially contracted and at rest.
- Fig. D. The same; the very young animal.
- Fig. E. The same; dorsal view of posterior portion of the animal, twice the natural size; pore closed.
- Fig. F. The same; lateral view, pore closed.

- Fig. G. The same; dorsal view, pore open.  
 a. mucus beads exuding.  
 b. slit widely opened, the walls or lips rolled out.  
 c. mucus accumulations.
- Fig. H. The same; lateral view, pore open.
- Fig. I. The same as last.
- Fig. J. The same; the internal shell plate.

## PLATE V.

Figs. F, H, drawn by W. G. Binney; A, C, D, by Arthur F. Gray; B, E, G, I, by T. D. A. Cockerell, of West Cliff, Custer Co., Colorado: all from life.

Fig. A. *Ariolimax niger*, fully extended.

Fig. B. *Ariolimax Hemphilli*, var. *maculatus*, Cockerell; animal contracted in alcohol.

Fig. C. *Ariolimax niger*; the caudal mucus pore, twice the natural size, dorsal view, the pore open.

- a. mucus exuding.  
 b. b. ridges each side of slit or channel.  
 c. mucus channel or pore.  
 d. little channels conducting mucus from back of animal into channel c.

Fig. D. The same; posterior view.

Fig. E. *Ariolimax Californicus*, in motion, natural size.

Fig. F. *Ariolimax Andersoni*, restored from an alcoholic specimen.

Fig. G. *Ariolimax Hemphilli*, in motion, with end of tail and pore.

Fig. H. Portion of genitalia of E.

- p. s. the penis sac.  
 f. the flagellum.  
 r. the retractor muscle.  
 v. d. the vas deferens.

Fig. I. *Ariolimax niger*, partially extended.

## PLATE VI.

Figures B, C, D, E, H, were drawn by A. H. Baldwin, the last from life, the others from specimens preserved in spirits; Figures F, G, by W. G. Binney, from life; A, from life, by Arthur F. Gray.

Fig. A. *Ariolimax Columbianus*, var. *maculatus*, Cockerell, natural size; from a specimen collected by Mr. Hemphill.

Fig. B, C. *Onchidium Floridanum*, three times natural size; from type.

Fig. D, E. *Onchidella Carpenteri*, twice natural size.

Fig. F. *Tebennophorus Wetherbyi*; from type.

Fig. G. Portion of genitalia of A.

- p. s. the penis sac.  
 r. the retractor of same.  
 v. d. the vas deferens.

Fig. H. *Tebennophorus Hemphilli*; from the type.

## PLATE VII.

All the figures drawn by T. D. A. Cockerell, excepting I, which was drawn by Miss Annie Roberts.

- Fig. A. *Prophysaon fasciatum*.  
 Fig. B. " *Pacificum*.  
 Fig. C. " *Andersoni*.  
 Fig. D. " *Hemphilli*.  
 Fig. E. " *pacificum*, jaw  
 Fig. F. " *humile*, jaw.  
 Fig. G. " " the animal contracted in spirits, and the surface.  
 Fig. H. " *Pacificum*; the same views as last.  
 Fig. I. " *cæruleum*.  
 Fig. J. " "  
 Fig. K. " *flavum*.  
 Fig. L. " *humile*.  
 Fig. M. " "

## PLATE VIII.

Figure C was drawn by F. W. Earl, from life; A, from life, by W. G. Binney; B, D, G, I, from life, by T. D. A. Cockerell; E, F, H, were restored by Mr. Cockerell from specimen in spirits

- Fig. A. *Phenacaron foliolatus*, natural size; the tail eaten off.  
 Fig. B. Internal shell of A.  
 Fig. C. The same, var. *Hemphilli*, natural size.  
 Fig. D. *Limax Hewstoni*; in motion and at rest.  
 Fig. E. " *Hemphilli*; same views as last, and surface  
 Fig. F. " *hyperboreus*; same views as last.  
 Fig. G. " *montanus*; same views.  
 Fig. H. " *occidentalis*; same views.  
 Fig. I. " *Hewstoni*; a larger individual.

## PLATE IX.

Figures A, B, C, D, G, H, were drawn by W. G. Binney; E, F, by T. D. A. Cockerell; I, J, by Arthur F. Gray.

- Fig. A. Jaw of *Hemphillia glandulosa*.  
 Fig. B. Jaw of *Phenacaron foliolatus*.  
 Fig. C. Lingual membrane of same; one central tooth, with its adjacent lateral and three extreme marginals.  
 Fig. D. Genitalia of same; one half of natural size.  
     *ov.* ovary.  
     *ovid.* oviduct.  
     *t.* testicle.  
     *g. b.* genital bladder.  
     *p. s.* penis sac.  
     *v. d.* vas deferens.

- Fig. E, F. *Veronicella olivacea*, from one of original lot from Folvon.  
 Fig. G. Lingual membrane of *Glandina decussata*.  
 Fig. H. Genitalia of *Phenacaron foliolatus*, var. *Hemphilli*; same references as in D; one half of natural size.  
 Fig. I. *Prophysaon Andersoni*; surface magnified sixteen times.  
     *a. a. a.* reticulations of the body.  
     *b. b.* foliolated spaces between reticulations.  
     *c.* lower edge of the body.  
     *d.* locomotive disk.  
 Fig. J. The same, magnified eight diameters; upper surface; same references as the last.

## PLATE X.

Drawn by A. H. Baldwin, Smithsonian Institution.

- Fig. A. *Aglaja fidelis*; the large, elevated black variety.  
 Fig. B. Sculpturing of same.  
 Fig. C. The same; small, black, elevated form.  
 Fig. D. Sculpturing of last.  
 Fig. E. The same; small, depressed form.  
 Fig. F. *Aglaja infumata*; sculpturing.  
 Fig. G. *Arionta Mormonum*; sculpturing of the form figured on Plate XI. Figs. G, H.

## PLATE XI.

Drawn by A. H. Baldwin.

- Fig. A. *Arionta arrosa*.  
 Fig. B. Variety of last, approaching *A. exarata*.  
 Fig. C. Sculpturing of last.  
 Fig. D. *Arionta exarata*; type.  
 Fig. E. Sculpturing of last.  
 Fig. F. *Arionta Mormonum*.  
 Fig. G, H. Variety of last, connecting with *Hillebrandi*.